DYNAMICS OF NANOSECOND DIELECTRIC BARRIER DISCHARGE DEVELOPMENT IN SYMMETRICAL AND ASYMMETRICAL DISCHARGE GAPS

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The difference of DBD ignition in symmetrical and asymmetrical discharge gap was studied. The numerical simulation of electric field near the bare grounded electrode is presented to explain it.

There are series of contributions on nanosecond atmospheric pressure air DBD in symmetrical discharge gap [1,2]. However, the dynamics of the discharge development in asymmetrical gaps has not been researched virtually. Therefore, a series of experiments were carried out in order to study it (fig.1). High-voltage rectangular pulses with nanosecond rise time were used as a power supply [3,4]. Various gap configurations were used: symmetrical and asymmetrical. Due to the presence of the segmented ground electrode, the spatial-temporal discharge generation was recorded [1,5]. According to the current waveforms, one can see an order of discharge ignition in every segment.

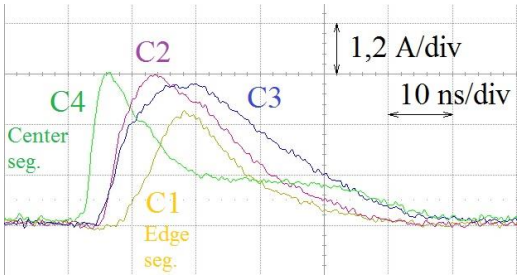

Figure 1. Current traces of the segmented electrode in 3 mm gap.

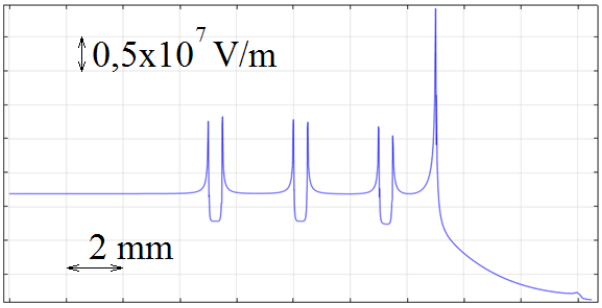

Figure 2. Electric field distribution near the segmented electrode.

Different discharge development appeared with the barrier on the ground electrode and without it. In the case of symmetric barrier discharge, the ignition started from the center of the electrode, but in the case of asymmetric one – from the edge. It can be explained by means of electrical field edge discontinuity and it is confirmed by numerical simulation (fig.2).

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